2.3. EDUCATIONAL CURRICULA

Issue

Some members of the public have a misperception that water they use is pure, and once it has been recycled, it has fallen from grace. School programs could teach how all water is recycled, and describe both natural and engineered approaches to assuring that water is safe for human consumption. Although water resource issues and very basic water cycle information is presently being taught in public schools, there is considerable room for improvement. Having the importance of water recycling added to the State education standards would dramatically improve the inclusion of the concept of water recycling in classrooms.

Recycled water is used in the landscaping of common areas, such as neighborhood parks, at Serrano, a residential development in El Dorado Hills, CA.

While individual water agencies can make strides in introducing students to recycled water and other water resource issues through their existing classroom education programs, significant change cannot take place until recognition of these water issues is made at the level of the State Board of Education. The board issues "content standards" for each grade, K-12, in each subject area such as science, math, history-social science and English-language arts. Because schools are now graded on how their students perform on the standardized State tests, principals and teachers are reluctant to allow classroom time for programs such as water education unless a clear connection can be made to the content standards for their grade level.

Many local water agencies with education programs are aware of the increased emphasis being placed on testing and the curriculum content standards and have made efforts to align their programs to the standards. While concepts such as the water cycle are included in the science content standards, recycled water is not mentioned specifically in any of the science or history/social science standards. The State needs to encourage the school districts to implement programs, and to provide educators the necessary materials and support for successful programs about water.

Recommendation 2.3.1.

A statewide panel should be convened to recommend changes to public schools and higher education curricula:

a. Develop a comprehensive water education curriculum for each grade (K-12) that incorporates recycled water in the Content Standards for California Public Schools: science standards and/or the history-social science standards,

b. Incorporate recycled water education into the curricula of institutions of higher education,

c. Enhance existing educational materials or programs, for example those offered through the Water Education Foundation, or other organizations.

Approach and Implementation:

To implement Recommendation 2.3.1. a, the Department of Education should appoint a panel on developing comprehensive water education curricula that includes recycled wa-

ter education. It is important that public education include a complete discussion of the water cycle, including elements such as wastewater treatment plant discharges and their influence on surface and groundwater supplies. The Department of Education should work with educators and the Department of Water Resources to develop comprehensive water education curricula. Department of Education should consider changes to carry out this recommendation beginning July 2003 and incorporate the changes into the applicable Content Standards at appropriate grade levels by January 2007.

The following concepts should be a part of this curriculum.

- Water is a finite resource. There is no such thing as "new" water.
- The population of California is growing, whereas developed water supplies are limited and in some cases diminishing.
- Conservation of water and other natural resources is critical.
- At the Grade 5 level and above, the water cycle should be discussed in each grade with greater detail and complexity in higher grade levels. A more sophisticated explanation of the cycle should include wastewater treatment discharges and their influence on surface and groundwater supplies.
- Water recycling is an important component in conservation efforts in California.
- Wastewater treatment plants mimic the way nature cleans water (sedimentation, aeration and filtration). However, treatment plants can clean larger quantities of water more quickly than nature.
- Recycled water is currently used for a variety of applications in California.
- Water quality is important to public health and must be considered in determining appropriate uses of recycled water.

Water education should also include field trips to water treatment and water recycling facilities, so students can learn about these processes first hand. Field and lab work should provide hands-on experience with many water cycle elements.

Recommendation 2.3.1. b points out that in addition to the need for people to become familiar with recycled water, there exists a need for university-trained specialists. Therefore, it is recommended that DWR approach the California universities about the need for more recycled water experts and request the incorporation of recycled water into their curricula. State funds available for water recycling research could be used to increase faculty and student interest in water recycling in California universities, as recommended in Recommendation 6.2.1. DWR should carry out this recommendation beginning July 2003.

To implement recommendation 2.3.1. c, DWR should help to enhance existing educational materials or programs on recycled water such as are currently offered through the Water Education Foundation, or through assistance on science fair projects. The enhancement should include such things as coloring books on recycled water, poster contests, et cetera. DWR should carry out this recommendation beginning July 2004.

2.4. STATE-SPONSORED MEDIA CAMPAIGN

Issue

The media plays an important role in broadcasting information to the public. The media can help inform the public about activities in their community by assisting utilities to spread the word about potential projects. The media informs the public of the opportunity, as well as responsibility, to speak up on important issues. In order for the media to inform the public, they need to be provided with accurate information. Regular briefings with the media ensure that the public, media, politicians, and project supporters are informed and that current questions are addressed. Informing the media is important because projects can take decades, and the people consulted in the beginning during project planning may no longer be around by the time a project is ready for implementation. Additionally, a well-informed public and a broad base of community supporters can reduce the effect of opposition caused by bad press and political misinformation.

Recommendation 2.4.1.

The State should develop a water issues information program for radio, television, print, and other media.

Approach and Implementation:

As with the anti-smoking campaign that includes radio and television advertisements reaching a large audience, a similar program should be developed to provide information on water issues on a large scale. These elements should be discussed in a water cycle context to increase public awareness of the "big" water picture. For example, a message to conserve water should also include a reminder that water is finite and therefore precious and must be preserved. By presenting water issues in the context of the water cycle, the public will become aware of the realities of water supply, including the fact that all water is recycled, and that there is considerable wastewater effluent in our present water supplies. In addition, water quality topics regarding newly discovered contaminants or concerns should be presented in a water cycle format to help describe relative risk in the context of all water supplies rather than concentrating on a specific supply such as recycled water. State agencies should develop a water issues information program and protocol for radio, television, and print media beginning July 2004 and ongoing thereafter.

Recommendation 2.4.2.

The State should work with organizations that have produced videos on water issues, including recycled water, and fund updates and expanded programming and encourage cable television networks to broadcast these videos regularly throughout the State.

Approach and Implementation:

The State should develop a program on water issues to inform the public on a large scale by utilizing the media. This program should be formulated utilizing other successful media informational campaigns. The campaign should utilize radio and television advertise-

Recycled water is used for air conditioning cooling towers in buildings in Irvine and Marin County, CA.

ments to reach large audiences. The State should also work with organizations such as the Water Education Foundation and other stakeholder groups, that have produced videos on water issues, including recycled water, and fund updates and expanded programming. Cable television networks should then be encouraged to broadcast these videos regularly throughout the State. State agencies should carry out this recommendation beginning July 2005.

Recommendation 2.4.3.

State agencies should prepare opinion editorial pieces for publication in newspapers throughout the State.

Approach and Implementation:

State agencies should develop opinion editorial pieces on water issues, including recycled water, for publication in newspapers throughout the State beginning January 2004.

Recommendation 2.4.4.

The State should retain an advertising agency/public relations firm to assist in the development of short messages with specific information on urgent topics such as drought, conservation, pollution prevention, water quality, stormwater, wastewater, or recycled water including indirect potable reuse.

Approach and Implementation:

The State DWR should carry out this recommendation beginning July 2004.

3. Plumbing Code/Cross-Connection Control

Recycled water may be used in buildings (cooling, toilet and urinal flushing, trap priming, fire suppression systems, industrial purposes, etc), and for irrigation at residential, park, school, and other urban landscape areas.

Regulations and guidelines have been developed to address public health concerns with the possible misuse of recycled water or the connection of recycled water piping with the potable water piping (cross-connection). An example of misuse is when someone unknowingly drinks from a recycled water outlet. A cross-connection can occur during initial construction, when a potable water system is retrofitted to recycled water use and potable water connections are overlooked, or when modifications or repairs are made to expand the system or increase pressure.

To help ensure against cross-connection between potable and recycled water lines in buildings, purple tape covers recycled water pipes and breakable seals are placed on valve handles to detect when water was shut off to perform plumbing changes. A log book is required to record all seal breaks and the plumbing work performed.

Portions of three California Codes have been identified as including impediments to recycled water use. These are the California Plumbing Code (CPC) Sections 601.2.2 and 601.2.3 and Appendix J dealing with dual plumbed systems, Title 17 Section 7583 et seq. dealing with cross-connection control, and Title 22 Sections 60313-60616 dealing with recycled water dual plumbed systems. These codes pose problems because of their adop-

tion status in some cases, inconsistencies between codes, and possibly unnecessarily restrictive requirements.

The Opus II building in Irvine, CA, uses recycled water treated by Irvine Ranch Water District in air conditioning cooling and toilet and urinal flushing.

3.1. UNIFORM PLUMBING CODE APPENDIX J

Issue

A national plumbing standard that is used by many states and localities is the Uniform Plumbing Code (UPC) that is issued by the International Association of Plumbing and Mechanical Officials (IAPMO). Appendix J of the Uniform Plumbing Code provides design standards to safely plumb buildings with both potable and recycled water systems. While the California Building Standards Commission (CBSC) uses the UPC as the basis of the California Plumbing Code, neither the CBSC nor any other California State agency has adopted Appendix J for use in California. The fact that Appendix J does not have official status in California is not well known, so some local agencies have been under the impression that it is a mandatory standard. On the other hand, at least one agency, the City and County of San Francisco, will not use Appendix J unless it is adopted by a State agency. Lacking a State standard, San Francisco has been hesitant to encourage indoor uses of recycled water. The IAPMO version of Appendix J contains inconsistencies with California regulations governing recycled water. There is a need for a California standard for recycled water plumbing in buildings.

Recommendation 3.1.1.

A California version of Appendix J of the Uniform Plumbing Code should be adopted in order to avoid the inconsistencies between the IAPMO version and other California regulations affecting indoor use of recycled water.

Approach and Implementation:

The Department of Water Resources in collaboration with other stakeholders should initiate the process to adopt a California version of Appendix J, considering the recommended draft of Appendix J included in Appendix D of this report. Time frame: July 2003-September 2005.

3.2. DHS GUIDANCE ON CROSS-CONNECTION CONTROL

Issue

Water Recycling Criteria are contained in Title 22 of the California Code of Regulations and provide requirements that protect public health. Article 5 of the criteria (Sections 60313-60316) include dual plumbed requirements are intended to prevent the unintentional misuse of recycled water and the cross-connection of the recycled water distribution system with the potable water system within buildings and for residential landscaping. These recycled water use sites are called out for special controls because they are believed to be at the greatest risk for unplanned public exposure. The proximity and complexity of recycled and potable plumbing systems within buildings and the potential for homeowner

modifications in residential situations create a risk. The dual plumbed section uses a combination of posting, plumbing access restrictions, plumbing labeling, supervision, periodic inspection, and testing to minimize the chance of misuse or cross-connection.

There are two concerns with the dual plumbed requirements.

1. In some counties the requirements are being applied to irrigation use areas not specified in the regulation. The sites that the dual plumbed requirements in Title 22 apply to are identified through a series of definitions in the regulation.

   Section 60301.310 defines "facility" as "any type of building or structure, or a defined area of specific use that receives water for domestic use from a public water system as defined in section 116275 of the Health and Safety Code."

   Section 60301.250 defines "dual plumbed system" and "dual plumbed" as "a system that utilizes separate piping systems for recycled water and potable water within a facility and where the recycled water is used for either of the following purposes:

   (a) to serve plumbing outlets (excluding fire suppression systems) within a building or

   (b) outdoor landscape irrigation at individual residences."

   Most of the requirements in Title 22, Article 5 (see Appendix E) apply only to dual-plumbed systems - plumbing outlets within buildings and landscape irrigation at individual residences. Due to a misunderstanding of the regulations, especially the definitions cited above, some county health departments have applied the dual plumbed requirements to all sites with both potable and recycled water service. Because the provisions for dual plumbed facilities are more stringent than for other types of sites where recycled water is used, these other sites have experienced inconvenience and expense that is not mandated by regulation.

2. Title 22, Section 60316(a) requires that "The recycled water system shall also be tested for possible cross-connections at least once every four years." The regulation Section 60314(a)(3) allows the use of a pressure (shut down), dye, or other test method. The shut down test is commonly used because it is considered conclusive, but this procedure disrupts water service, which may not be acceptable for certain users, such as penal institutions, or may be costly for some users, such as continuously operated industrial facilities. In addition to dye testing, at least one other method of assuring the absence of a cross-connection in buildings has been proposed, using numbered breakable seals on valves to detect when plumbing work has been done and log books to record what type of plumbing work was done. This latter procedure is described in the proposed draft California Appendix J included in Appendix D of this paper.

Recommendation 3.2.1.

DHS guidance should be prepared that would clarify the intent and applicability of Title 22, Article 5. If guidance cannot be written to accomplish this, the regulation should be rewritten.